II. REMARKS/ARGUMENTS

A. General

The application still contains 56 claims.

Claims 1, 37, 40, 44 and 46 have been amended in order to better define the subject matter being claimed. No new matter has been added to the claims under the current amendment.

Claims 52 and 56 remain cancelled from the present application.

B. Acknowledgement of Allowance

The Applicant gratefully acknowledges the allowance of claims 5-24, 38 and 39, as indicated by the Examiner on page 15 of the Office Action.

C. Summary of Rejection under 35 USC §102(a) and Response

In the Office Action, the Examiner has rejected claims 46-49, 51, and 57 under 35 USC §102(a) as being anticipated by Canadian Patent 2,292,828 (hereafter to be referred to as Lyon).

In light of the amendments made to the claims, the Applicant respectfully traverses the Examiner's rejection, and submits that claims 46-49, 51, and 57, as they now stand, are in allowable form.

Claim 46-49, 51, and 57

The Examiner's attention is respectfully directed towards the following limitation of independent claim 46:

> A method of regulating packet flow through a device having an ingress entity, an egress entity, a processing fabric between the ingress entity and the egress entity, and a control entity adapted to process packets prior to transmission thereof to the ingress entity, said method comprising:
>
> obtaining congestion information regarding packets received at the egress entity, **wherein obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity; and**
>
> providing the congestion information to the control entity, for use by the control entity in processing packets prior to transmission thereof to the ingress entity.

The Applicant respectfully submits that Lyon does not disclose, teach or suggest the above-emphasized limitation of independent claim 46. More specifically, Lyon does not disclose "wherein obtaining said congestion information includes *determining the amount of bandwidth consumed by packets* arriving at the egress entity".

Instead, Lyon measures the *depth* of the egress queues, (p.12, lines 16-17), which as indicated in the Applicant's previous response is a *quantity* of bits stored at the egress. This is completely different from determining the *amount of bandwidth consumed* by packets at the egress entity, as defined in claim 46. More specifically, the amount of bandwidth consumed by packets is a measure of *bits per second (i.e.* a rate of arrival of bits*)*.

In order to illustrate the difference, consider a router with 100 milliseconds of egress buffering (standard in the industry today), where traffic bursts at 10X the port capacity for 20 milliseconds and then drops to zero.

At time T=0, the queues are empty (queue depth = no congestion), however, the bandwidth consumed by packets received is 1000% of the port capacity (bandwidth = extreme congestion).

At time T=1 millisecond, the queues are still only 10% full (queue depth = low congestion) and the bandwidth consumed by packets received is still 1000% (extreme congestion).

At time T=10 milliseconds, the queues are 90% full (queue depth = very high congestion) and the bandwidth consumed by packets received is still 1000% (extreme congestion).

At time T=11 milliseconds, the queues are 100% full (queue depth = extreme congestion) and packets are still arriving at 1000% (extreme congestion).

At time T=20 milliseconds, the queues are 100% full (queue depth = extreme congestion) but packets have stopped arriving. As such, the bandwidth consumed by packets received is 0% (no congestion).

At time T=30 milliseconds, the queues are down to 90% full (queue depth = very high congestion) but no packets are arriving so the bandwidth consumed by packets received is still 0% (no congestion).

As demonstrated by the above example, the queue depth, which is what is being measured by Lyon, is completely different from a determination of the amount of bandwidth consumed. The queue depth, and the amount of bandwidth consumed are not interchangeable concepts. In light of this, the Applicant respectfully submits that the queue "congestion levels" as disclosed by Lyon do not read on "determining the amount of bandwidth consumed by packets arriving at the egress entity", as defined in independent claim 46. Accordingly, Lyon does not teach or suggest the above emphasized limitation of independent claim 46.

As per §2131 of the MPEP, in order "to anticipate a claim, the reference must teach every element of the claim". Since Lyon does not teach the limitation of

"wherein obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity", Lyon does not support a rejection based on anticipation. Accordingly, claim 46 as amended meets the requirements of 35 U.S.C. 102.

The Applicant therefore submits that claim 46 is in allowable form, and respectfully requests that the Examiner withdraw his rejection of independent claim 46.

Claims 47-49, 51, and 57 depend from independent claim 46 and, as such, incorporate by reference all the limitations contained therein, including the following limitation which has been shown to be absent from Lyon:

> **obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity**

Accordingly, claims 47-49, 51, and 57 are also believed to be in condition for allowance as being dependent upon an allowable base claim. The Examiner is respectfully requested to withdraw the rejection to dependent claims 47-49, 51, 52, 56 and 57.

D. Summary of Rejection under 35 USC §103(a) and Response

Claims 1-4,25-37, 40-45 and 53-55

On page 3 of the Office Action, the Examiner has rejected claims 1-4, 25-37, 40-45 and 53-55 under 35 USC §103(a) as being unpatentable over Lyon in view of U.S. Patent Application 2002/0105908 (hereafter to be referred to as Blumer et al.)

For the reasons presented below, the Applicant respectfully submits that claims 1-4, 25-37, 40-45 and 53-55, as they currently stand, overcome the Examiner's rejections.

The Examiner's attention is respectfully directed towards the following emphasized limitations of independent claim 1.

> **Claim 1**
> A method of regulating packet flow through a device having a processing fabric with at least one input port and at least one output port, a control entity connected to the at least one input port for regulating packet flow thereto, and a plurality of egress queues connected to the at least one output port for temporarily storing packets received therefrom, said method comprising:
> obtaining bandwidth utilization information regarding packets received at the egress queues, **wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues**;
> **determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue**; and
> providing the discard probability associated with each egress queue to the control entity, for use by the control entity in selectively transmitting packets to the at least one input port of the processing fabric.

The Applicant respectfully submits that neither of the references cited by the Examiner disclose, teach or suggest the above-emphasized limitations of independent claim 1. More specifically, neither Lyon nor Blumer et al. disclose the limitation of "wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues" nor do they disclose the limitation of "determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue".

Firstly, for the same reasons as those presented above with respect to independent claim 46, the Applicant respectfully submits that Lyon does not disclose "determining the amount of bandwidth consumed by packets received at

each of said egress queues". More specifically, as previously indicated, Lyon discloses measuring the queue depth and not the amount of bandwidth consumed. Accordingly, Lyon does not disclose this limitation of independent claim 1.

Furthermore, Blumer et al. does not disclose this limitation either. Instead, Blumer et al. discloses a mechanism for determining a drop probability for a buffer using a number of variables. The Examiner points to paragraph [0029] of Blumer et al. for a description of the variables used. Upon review of paragraph [0029], the Applicant respectfully submits that the amount of bandwidth consumed by received packets is not one of the variables. Accordingly, Blumer et al. does not disclose this limitation either.

Secondly, with regard to the second limitation, the Examiner concedes on page 4 of the Office Action that Lyon does not specifically disclose "determining from the bandwidth utilization information, a discard probability associated with each egress queue". It thus follows that Lyon does not disclose "determining, from the bandwidth utilization information *and* the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue".

The Applicant further submits that the above limitation is also absent from Blumer et al. As mentioned above, while Blumer et al. provides a list of variables in paragraph 29 that can be used in determining drop probability, the amount of bandwidth consumed by packets received at the egress queues is not among them. As such, Blumer et al. does not disclose "determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue"[emphasis added].

As per § 2143.03 of the *Manual of Patent Examining Procedure*, in order to establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest all of the claim limitations. Since it has been shown that neither Lyon nor Blumer et al. teach two of the limitations of independent claim 1, the Applicant respectfully submits that the combination of these references is not sufficient for establishing a *prima facie* case of obviousness as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw his rejection of independent claim 1.

Claims 2-4, 25-36 and 44-45 depend from independent claim 1 and, as such, incorporate by reference all the claim limitations contained therein, including the aforementioned limitations which have already been shown to be absent from both Lyon and Blumer et al. Accordingly, for the same reasons as those presented above with respect to claim 1, the Applicant respectfully submits that the combination of Lyon and Blumer et al. is not sufficient to establish a prima facie case of obviousness for claims 2-4, 25-36 and 44-45. The Examiner is respectfully requested to withdraw the rejection to dependent claims 2-4, 25-36 and 44-45.

The Examiner's attention is respectfully directed towards the following emphasized limitation of independent claim 37.

> **Claim 37**
> A drop probability evaluation module for use in a device having (i) a processing fabric with at least one input port and at least one output port; (ii) a control entity connected to the at least one input port for regulating packet flow thereto; and (iii) a plurality of egress queues connected to the at least one output port for temporarily storing packets received therefrom, said drop probability evaluation module comprising:
>
> means for obtaining bandwidth utilization information regarding packets received at the egress queues, wherein obtaining said bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each of said egress queues;
>
> **means for determining, from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue; and**

means for providing the discard probability associated with each egress queue to the control entity, for use by the control entity in selectively transmitting packets to the at least one input port of the processing fabric.

For the same reasons as those presented above with respect to independent claim 1, the Applicant respectfully submits that neither Lyon nor Blumer et al. disclose the above emphasized limitation of independent claim 37. As such, these references are insufficient to establish a *prima facie* case of obviousness as per § 2143.03 of the *MPEP*. The Examiner is respectfully requested to withdraw the rejection to independent claim 37.

The Examiner's attention is respectfully directed towards the following emphasized limitation of independent claim 40.

An apparatus, comprising:
a processing fabric having at least one input port and at least one output port, the processing fabric being adapted to process packets received from the at least one input port and forward processed packets to the at least one output port;
a plurality of egress queues, each connected to a corresponding one of the at least one output port of the processing fabric, each egress queue being adapted to (i) temporarily store packets received from the corresponding output port of the processing fabric and (ii) determine bandwidth utilization information on the basis of the packets received at the egress queues, **by determining the amount of bandwidth consumed by packets received at each of said egress queues;**
a drop probability evaluation module connected to the egress queues, said drop probability evaluation entity being adapted to **determine a discard probability associated with each of the egress queues on the basis of the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues; and**
a packet acceptance unit connected to the at least one input port of the processing fabric and to the drop probability evaluation module, the packet acceptance entity being adapted to (i) receive packets destined for the at least one output port of the processing fabric; (ii) identify an egress queue associated with each received packet; and (iii) on the basis of the discard probability associated with the egress queue associated with each received packet, either transmit or not transmit said received packet to one of the at least one input port of the processing fabric.

For the same reasons as those presented above with respect to independent claim 1, the Applicant respectfully submits that neither Lyon nor Blumer et al. disclose the above emphasized limitations of independent claim 40. As such, these references are insufficient to establish a *prima facie* case of obviousness

as per § 2143.03 of the *MPEP*. The Examiner is respectfully requested to withdraw his rejection of independent claim 40.

Claims 41-43 depend from independent claim 40 and, as such, incorporate by reference all the claim limitations contained therein, including the aforementioned limitations which have already been shown to be absent from both Lyon and Blumer et al. Accordingly, for the same reasons as those presented above with respect to claim 40, the Applicant respectfully submits that the combination of Lyon and Blumer et al. is not sufficient to establish a prima facie case of obviousness for claims 41-43. The Examiner is respectfully requested to withdraw the rejection to dependent claims 41-43.

Claims 53-55 depend from independent claim 46 and as such incorporate by reference all the limitations contained therein, including the following limitation which has already been shown to be absent from Lyon.

> obtaining congestion information regarding packets received at the egress entity, **said congestion information including information associated with the amount of bandwidth consumed by packets arriving at the egress entity; and**

It is further submitted that the above limitation is also absent from Blumer et al. As indicated above with respect to independent claim 1, Blumer et al. teaches a refinement to calculating a drop probability based on queue depth (a quantity of bits stored), and uses that drop probability locally. Blumer et al. lists in paragraph 29 a number of other factors that can be taken into account, but the amount of bandwidth is not in the list. As such, Blumer et al. does not teach this limitation of independent claim 46.

Accordingly, since neither Lyon nor Blumer et al. teach the above limitation of independent claim 46, and since claims 53-55 depends from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner

do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw the rejection to dependent claims 53-55 under 35 U.S.C. §103(a).

Claim 50

On page 14 of the Office Action, the Examiner has rejected claim 50 under 35 USC §103(a) as being unpatentable over Lyon in view of U.S. Patent 6,813,242 (hereafter to be referred to as Haskin et al.)

Claim 50 depends from independent claim 46 and as such incorporates by reference all the limitations contained therein, including the following limitation which has already been shown to be absent from Lyon:

> **obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity**

The Applicant further submits that this limitation is also absent from Haskin et al. As can be seen from Haskin's Fig. 3 and the accompanying description in column 4, lines 51-62, Haskin et al. teaches monitoring for the presence of traffic coming into a switch from an external link, and using that information to infer either congestion or a failed link and then reroute traffic. Nowhere does Haskin et al. disclose congestion information that includes "determining the amount of bandwidth consumed by packets arriving at the *egress* entity".

Accordingly, since neither Lyon nor Haskin et al. teach the above limitation of independent claim 46, and since claim 50 depends from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw his rejection of claim 50 under 35 U.S.C. §103(a).

Claim 58

On page 15 of the Office Action, the Examiner has rejected claim 58 under 35 USC §103(a) as being unpatentable over Lyon in view of U.S. Patent 6,728,253 (hereafter to be referred to as Jefferies et al.)

Claim 58 depends from independent claim 46 and as such incorporates by reference all the limitations contained therein, including the following limitation which has already been shown to be absent from Lyon:

> **obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity**

The Applicant further submits that this limitation is also absent from Jefferies et al. As can be seen from Jefferies et al. at col. 2, lines 25-44, this reference relates to using queue occupancy (buffer depth again) to selectively pause and re-enable transmission to a set of queues. Nowhere does Jefferies et al. disclose congestion information that includes "determining the amount of bandwidth consumed by packets arriving at the *egress* entity".

Accordingly, since neither Lyon nor Jefferies et al. teach the above limitation of independent claim 46, and since claim 58 depends from independent claim 46, the Applicant respectfully submits that the references cited by the Examiner do not support a *prima facie* case of obviousness, as per § 2143.03 of the MPEP. Accordingly, the Examiner is respectfully requested to withdraw his rejection of claim 58 under 35 U.S.C. §103(a).

RECEIVED
CENTRAL FAX CENTER

SEP 15 2006

III. CONCLUSION

In view of the above, it is respectfully submitted that all of claims 1-51, 53-55 and 57-58 are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance of claims 1-51, 53-55 and 57-58 at an early date is solicited.

If the claims of the application are not considered to be in full condition for allowance, for any reason, the Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims or in making constructive suggestions so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

Dated: September 15, 2006

Stephan P. Georgiev
Reg. No. 37,563
Agent for the Applicant

SMART & BIGGAR
1000 De La Gauchetière Street West
Suite 3300
Montreal, Quebec H3B 4W5
CANADA
Tel.: (514) 954-1500
Fax: (514) 954-1396